

FCC TEST REPORT

For

Zhejiang Feishen Vehicle Co., LTD.

2in1 2.4GHz Transmitter

Model No.: FS-GT11, FS-GT10, FS-GT12, FS-GT13,
FS-GT14, SI-2EE, SI-3EE, SI-4EE, SI-13EE

Prepared For : Zhejiang Feishen Vehicle Co., LTD.
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Province, Yong Kang, China

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Date of Test : Nov. 29, 2017~Jan. 08, 2018
Date of Report : Jan. 08, 2018

Contents

1. General Information.....	5
1.1. Client Information.....	5
1.2. Description of Device (EUT).....	5
1.3. Auxiliary Equipment Used During Test.....	5
N/A.....	5
1.4. Description of Test Modes.....	6
1.5. List of channels.....	7
1.6. Description Of Test Setup.....	9
1.7. Test Equipment List.....	10
1.8. Measurement Uncertainty.....	11
1.9. Description of Test Facility.....	11
2. Summary of Test Results.....	12
3. Conducted Emission Test.....	13
3.1. Test Standard and Limit.....	13
3.2. Test Setup.....	13
3.3. Test Procedure.....	13
3.4. Test Data.....	13
4. Radiation Spurious Emission and Band Edge.....	14
4.1. Test Standard and Limit.....	14
4.2. Test Setup.....	14
4.3. Test Procedure.....	15
4.4. Test Data.....	16
5. Maximum Peak Output Power Test.....	23
5.1. Test Standard and Limit.....	23
5.2. Test Setup.....	23
5.3. Test Procedure.....	23
5.4. Test Data.....	23
6. 20DB Occupy Bandwidth Test.....	26
6.1. Test Standard.....	26
6.2. Test Setup.....	26
6.3. Test Procedure.....	26
6.4. Test Data.....	26
7. Carrier Frequency Separation Test.....	29
7.1. Test Standard and Limit.....	29
7.2. Test Setup.....	29
7.3. Test Procedure.....	29
7.4. Test Data.....	29
8. Number of Hopping Channel Test.....	32
8.1. Test Standard and Limit.....	32
8.2. Test Setup.....	32
8.3. Test Procedure.....	32
8.4. Test Data.....	32

9. Dwell Time Test.....	34
9.1. Test Standard and Limit.....	34
9.2. Test Setup.....	34
9.3. Test Procedure.....	34
9.4. Test Data.....	34
10. 100kHz Bandwidth of Frequency Band Edge Requirement.....	38
10.1. Test Standard and Limit.....	38
10.2. Test Setup.....	38
10.3. Test Procedure.....	38
10.4. Test Data.....	38
11. Antenna Requirement.....	42
11.1. Test Standard and Requirement.....	42
11.2. Antenna Connected Construction.....	42
APPENDIX I -- TEST SETUP PHOTOGRAPH.....	43
APPENDIX II -- EXTERNAL PHOTOGRAPH.....	44
APPENDIX III -- INTERNAL PHOTOGRAPH.....	47

TEST REPORT

Applicant : Zhejiang Feishen Vehicle Co., LTD.
Manufacturer : Ningbo Wecopter Aviation Technology Co., Ltd.
Product Name : 2in1 2.4GHz Transmitter
Model No. : FS-GT11, FS-GT10, FS-GT12, FS-GT13, FS-GT14, SI-2EE, SI-3EE, SI-4EE, SI-13EE
Trade Mark : N.A.
Rating(s) : TX: Input: DC 6V, 200mA by "AA" Battery*4

Test Standard(s) : FCC Part15 Subpart C 2017, Section 15.247

Test Method(s) : ANSI C63.10: 2013

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Nov. 29, 2017~Jan. 08, 2018

Prepared by :



Winkey Wang

(Tested Engineer / Winkey Wang)

Reviewer :

Tangcy. T.

(Project Manager / Tangcy. T)

Approved & Authorized Signer :

Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	Zhejiang Feishen Vehicle Co., LTD.
Address	:	North Lake Road Hardware Science And Technology In, ZheJiang Province, Yong Kang, China
Manufacturer	:	Ningbo Wecopter Aviation Technology Co., Ltd.
Address	:	Room 1304, Dahai Building, No.577 Tiantong South Road, South Business District, Ningbo, China

1.2. Description of Device (EUT)

Product Name	:	2in1 2.4GHz Transmitter	
Model No.	:	FS-GT11, FS-GT10, FS-GT12, FS-GT13, FS-GT14, SI-2EE, SI-3EE, SI-4EE, SI-13EE (Note: The Samples are the same except the model number and colour, So we prepare “FS-GT11” for test only.)	
Trade Mark	:	N.A.	
Test Power Supply	:	DC 6V Battery inside	
Product Description	:	Operation Frequency:	2402.5MHz~2480MHz
		Number of Channel:	156 Channels
		Modulation Type:	GFSK
		Antenna Type:	Copper coil Antenna
		Antenna Gain(Peak):	2.0 dBi
Remark: 1) For a more detailed features description, plesase refer to the manufacturer’s specifications or the User’s Manual. 2) The system works in the frequency range of 2402.5MHz to 2480MHz.This band has been divided to 156 independent channels. Each radio system uses 16 different channels, the minimum channel separation is ≥ 1 MHz. By using various switch-on times, hopping scheme and channel frequencies, the system can guarantee a jamming free radio transmission.			

1.3. Auxiliary Equipment Used During Test

Adapter	:	N/A
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1.4. Description of Test Modes

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	2402.5MHz
Mode 2	2440.5MHz
Mode 3	2480.0MHz
Mode 4	Keeping TX Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Keeping TX Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	2402.5MHz
Mode 2	2440.5MHz
Mode 3	2480.0MHz
Mode 4	Keeping TX Mode

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The data rate was set in 1Mbps for radiated emission due to the highest RF output power.

1.5. List of channels

Channel	Freq.	Channel	Freq.	Channel	Freq.	Channel	Freq.	Channel	Freq.
	(MHz)		(MHz)		(MHz)		(MHz)		(MHz)
1	2402.5	33	2418.5	65	2434.5	97	2450.5	129	2466.5
2	2403	34	2419	66	2435	98	2451	130	2467
3	2403.5	35	2419.5	67	2435.5	99	2451.5	131	2467.5
4	2404	36	2420	68	2436	100	2452	132	2468
5	2404.5	37	2420.5	69	2436.5	101	2452.5	133	2468.5
6	2405	38	2421	70	2437	102	2453	134	2469
7	2405.5	39	2421.5	71	2437.5	103	2453.5	135	2469.5
8	2406	40	2422	72	2438	104	2454	136	2470
9	2406.5	41	2422.5	73	2438.5	105	2454.5	137	2470.5
10	2407	42	2423	74	2439	106	2455	138	2471
11	2407.5	43	2423.5	75	2439.5	107	2455.5	139	2471.5
12	2408	44	2424	76	2440	108	2456	140	2472
13	2408.5	45	2424.5	77	2440.5	109	2456.5	141	2472.5
14	2409	46	2425	78	2441	110	2457	142	2473
15	2409.5	47	2425.5	79	2441.5	111	2457.5	143	2473.5
16	2410	48	2426	80	2442	112	2458	144	2474
17	2410.5	49	2426.5	81	2442.5	113	2458.5	145	2474.5
18	2411	50	2427	82	2443	114	2459	146	2475
19	2411.5	51	2427.5	83	2443.5	115	2459.5	147	2475.5
20	2412	52	2428	84	2444	116	2460	148	2476
21	2412.5	53	2428.5	85	2444.5	117	2460.5	149	2476.5
22	2413	54	2429	86	2445	118	2461	150	2477
23	2413.5	55	2429.5	87	2445.5	119	2461.5	151	2477.5
24	2414	56	2430	88	2446	120	2462	152	2478
25	2414.5	57	2430.5	89	2446.5	121	2462.5	153	2478.5
26	2415	58	2431	90	2447	122	2463	154	2479
27	2415.5	59	2431.5	91	2447.5	123	2463.5	155	2479.5
28	2416	60	2432	92	2448	124	2464	156	2480
29	2416.5	61	2432.5	93	2448.5	125	2464.5	/	/

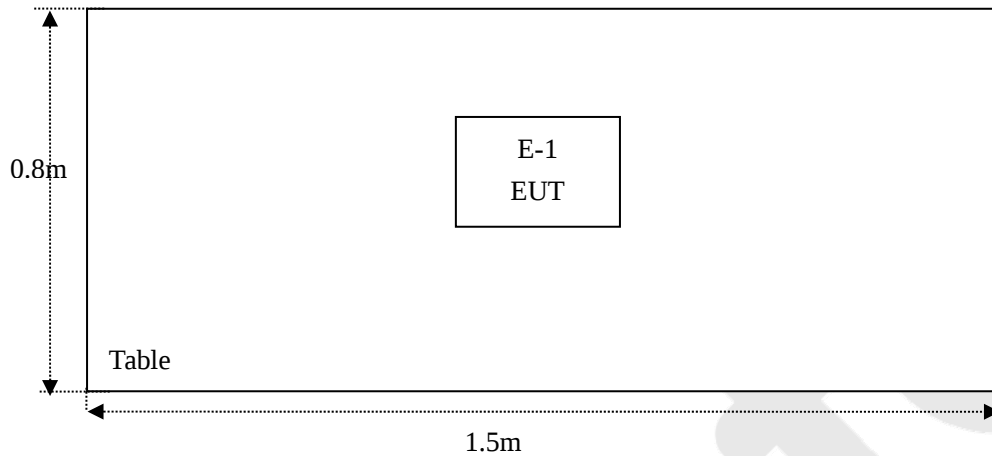
30	2417	62	2433	94	2449	126	2465	/	/
31	2417.5	63	2433.5	95	2449.5	127	2465.5	/	/
32	2418	64	2434	96	2450	128	2466	/	/

Note:

1. The engineering test program was provided and the EUT was programmed to be in continuously transmitting mode.
2. EUT built-in battery-powered, fully-charged battery use of the test battery.

1.6. Description Of Test Setup

RE



1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 17, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 17, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 17, 2017	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	Nov. 17, 2017	1 Year
5.	Spectrum Analysis	Agilent	N9038A	MY53227295	Nov. 17, 2017	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Nov. 17, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Nov. 17, 2017	1 Year
8.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 20, 2017	1 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 20, 2017	1 Year
10.	Loop Antenna	Schwarzbeck	HFH2-Z2	100047	Nov. 17, 2017	1 Year
11.	Horn Antenna	Schwarzbeck	BBHA9170	9170-375	Nov. 17, 2017	1 Year
12.	Pre-amplifier	SONOMA	310N	186860	Nov. 17, 2017	1 Year
13.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
14.	RF Test Control System	YIHENG	YH3000	2017430	Nov. 18, 2017	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN045	Nov. 17, 2017	1 Year
16.	Power Sensor	DAER	RPR3006W	15I00041SN046	Nov. 17, 2017	1 Year
17.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 18, 2017	1 Year
18.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 18, 2017	1 Year
19.	Signal Generator	Agilent	E4421B	MY41000743	Nov. 18, 2017	1 Year
20.	DC Power Supply	LW	TPR-6410D	349315	Nov. 01, 2017	1 Year
21.	Constant Temperature Humidity Chamber	Sertep	ZJ-HWHS80 B	ZJ-17042804	Nov. 01, 2017	1 Year

1.8. Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1 dB (Horizontal)
		Ur = 4.3 dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.9. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited.
at 1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District,
Shenzhen, Guangdong, China.518102

2. Summary of Test Results

Standard Section	Test Item	Result
15.203/15.247(c)	Antenna Requirement	PASS
15.207	Conducted Emission	N/A
15.205/15.209	Spurious Emission	PASS
15.247(b)(1)	Conducted Peak Output Power	PASS
15.247(a)(1)	20dB Occupied Bandwidth	PASS
15.247(a)(1)	Carrier Frequencies Separation	PASS
15.247(a)(1)	Hopping Channel Number	PASS
15.247(a)(1)	Dwell Time	PASS
15.247(d)	Band Edge	PASS
Remark: “N/A” is an abbreviation for Not Applicable.		

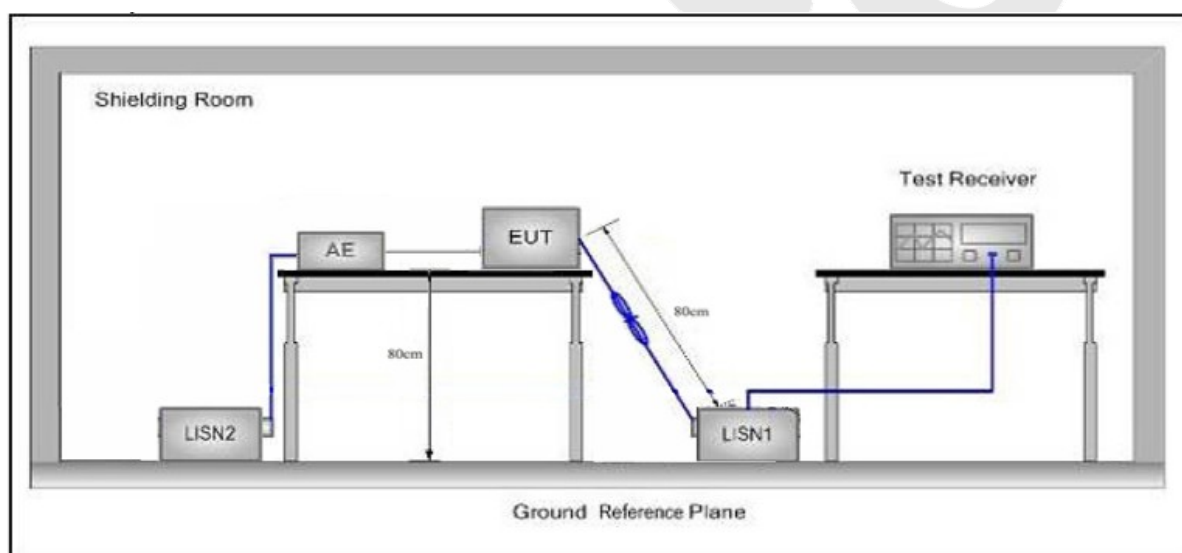
3. Conducted Emission Test

3.1. Test Standard and Limit

Test Standard	FCC Part15 Section 15.207		
Test Limit	Frequency	Maximum RF Line Voltage (dBuV)	
		Quasi-peak Level	Average Level
	150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
	500kHz~5MHz	56	46
	5MHz~30MHz	60	50

Remark: (1) *Decreasing linearly with logarithm of the frequency.
(2) The lower limit shall apply at the transition frequency.

3.2. Test Setup



3.3. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

3.4. Test Data

There is DC 6V Battery inside, So there is no need to test.

4. Radiation Spurious Emission and Band Edge

4.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.209 and 15.205				
Test Limit	Frequency (MHz)	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz~0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz~88MHz	100	40.0	Quasi-peak	3
	88MHz~216MHz	150	43.5	Quasi-peak	3
	216MHz~960MHz	200	46.0	Quasi-peak	3
	960MHz~1000MHz	500	54.0	Quasi-peak	3
	Above 1000MHz	500	54.0	Average	3
		-	74.0	Peak	3

Remark:

(1)The lower limit shall apply at the transition frequency.

(2) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

4.2. Test Setup

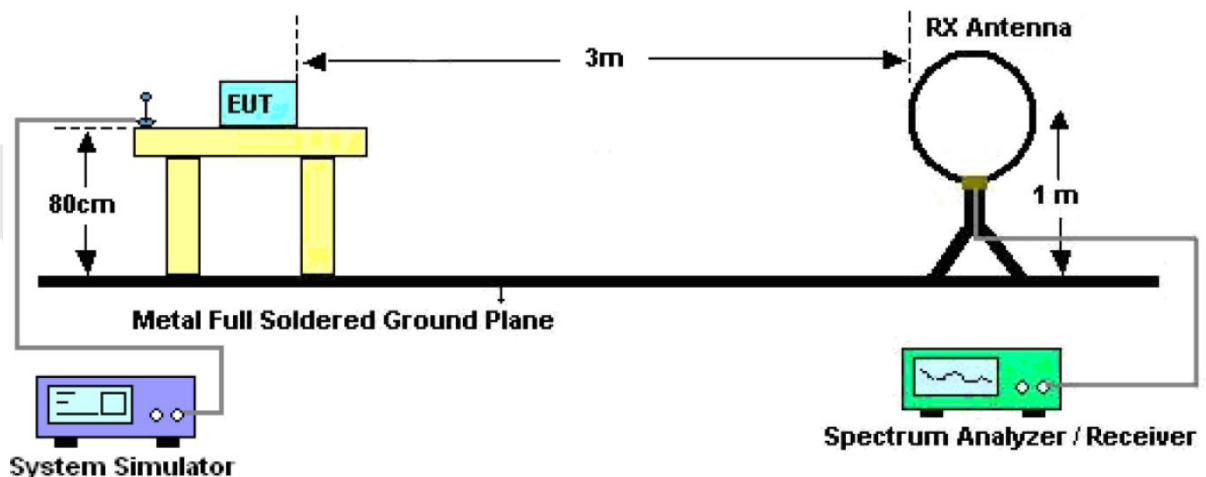


Figure 1. Below 30MHz

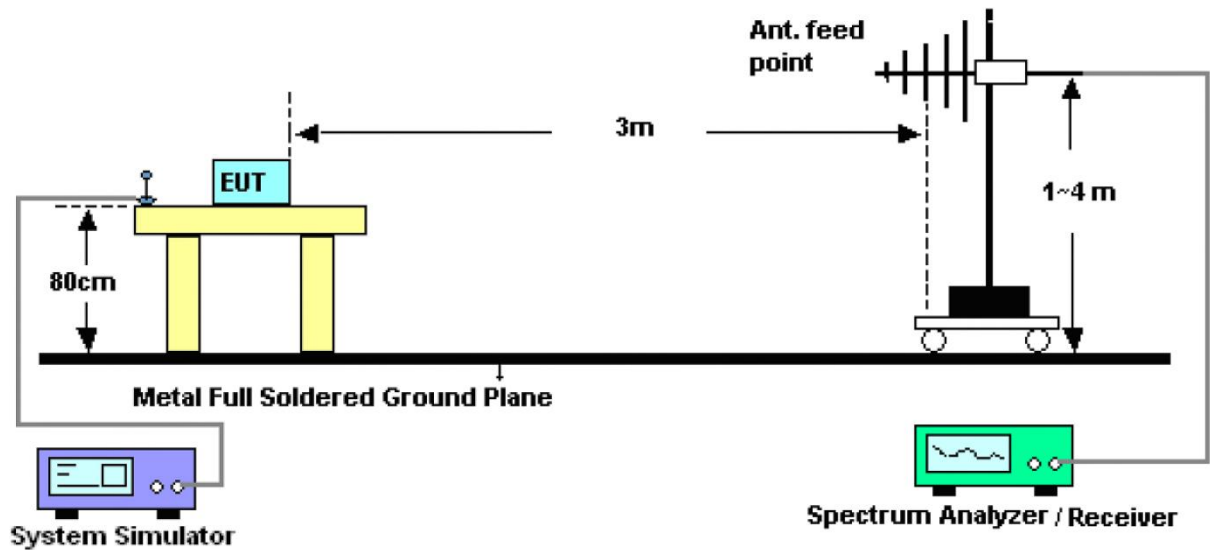


Figure 2. 30MHz to 1GHz

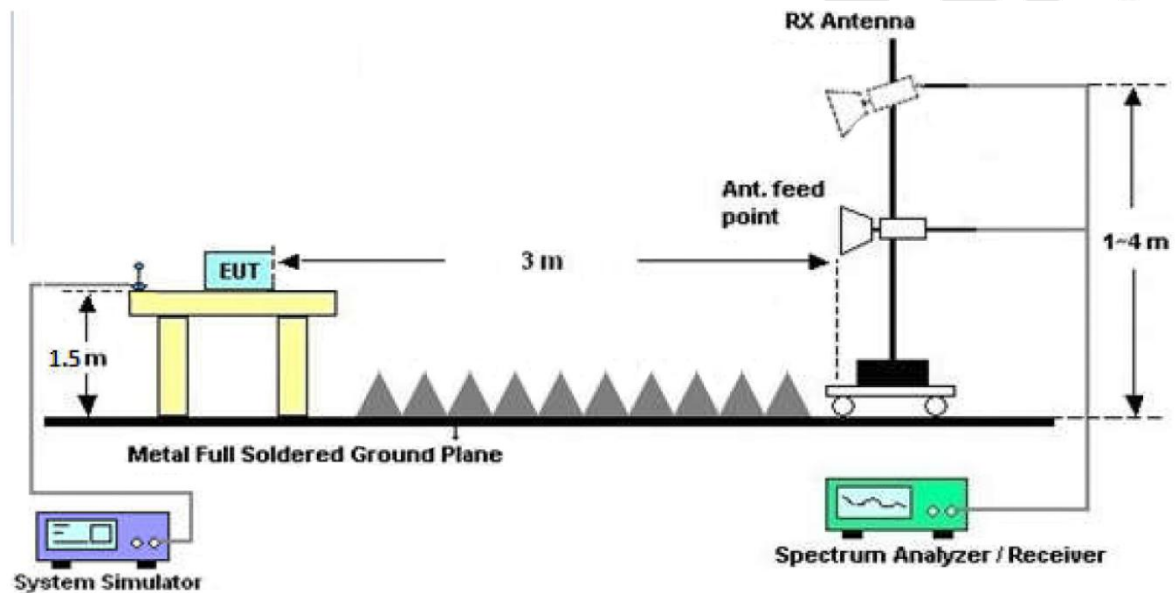


Figure 3. Above 1 GHz

4.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.

For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Rotated the EUT through three orthogonal axes to determine the maximum emissions, both horizontal and vertical polarization of the antenna are set on test. The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying

aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

For 9kHz to 150kHz, Set the spectrum analyzer as:

RBW = 200Hz, VBW = 1kHz, Detector = Quasi-Peak, Trace mode = Max hold, Sweep = auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:

RBW = 9kHz, VBW = 30kHz, Detector = Quasi-Peak, Trace mode = Max hold, Sweep = auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:

RBW = 100kHz, VBW = 300kHz, Detector = Quasi-Peak, Trace mode = Max hold, Sweep = auto couple.

For above 1GHz, Set the spectrum analyzer as:

RBW = 1MHz, VBW = 1MHz, Detector = Peak, Trace mode = Max hold, Sweep = auto couple.

RBW = 1MHz, VBW = 10Hz, Detector = Average, Trace mode = Max hold, Sweep = auto couple.

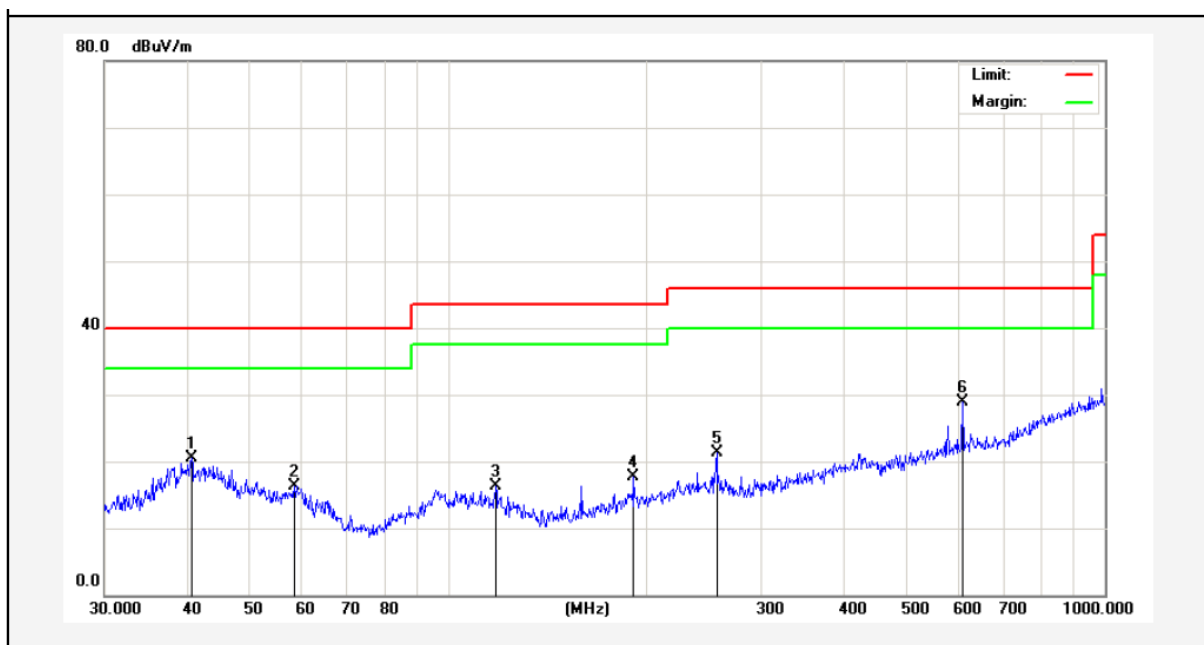
4.4. Test Data

PASS

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Test Results (30~1000MHz)

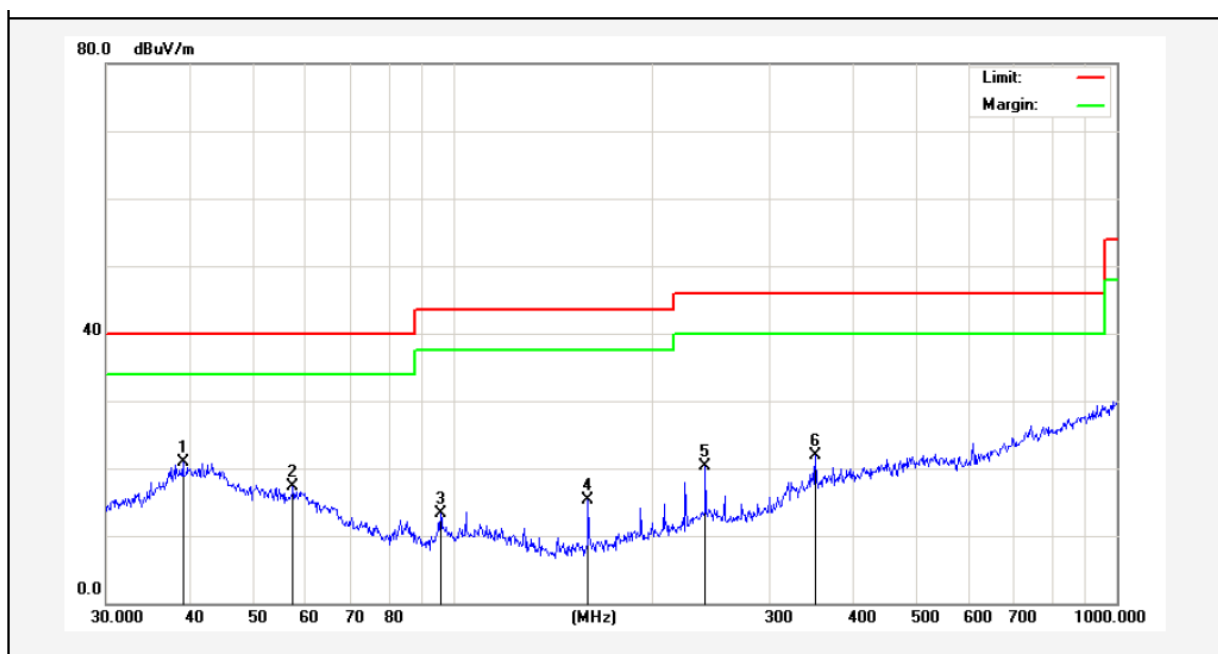
Job No.: 0217110117W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH
Standard: FCC PART 15C Power Source: DC 6V Battery inside
Test Mode: Keeping TX Mode Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	40.7016	31.56	-11.11	20.45	40.00	-19.55	QP	300	16	
2	58.4074	31.51	-15.26	16.25	40.00	-23.75	QP	300	69	
3	118.1862	37.59	-21.20	16.39	43.50	-27.11	QP	300	112	
4	191.7450	38.59	-20.92	17.67	43.50	-25.83	QP	300	154	
5	256.5211	40.08	-18.84	21.24	46.00	-24.76	QP	300	210	
6	607.7867	40.00	-11.03	28.97	46.00	-17.03	QP	300	266	

Test Results (30~1000MHz)

Job No.: 0217110117W Temp.(°C)/Hum.(%RH): 24.3°C/55%RH
Standard: FCC PART 15C Power Source: DC 6V Battery inside
Test Mode: Keeping TX Mode Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.1616	32.32	-11.48	20.84	40.00	-19.16	QP	300	16	
2	57.3923	32.53	-15.15	17.38	40.00	-22.62	QP	300	55	
3	95.7622	29.21	-15.98	13.23	43.50	-30.27	QP	300	112	
4	159.7844	33.22	-17.88	15.34	43.50	-28.16	QP	300	241	
5	239.9874	34.36	-14.09	20.27	46.00	-25.73	QP	300	299	
6	351.7079	34.81	-12.93	21.88	46.00	-24.12	QP	300	343	

Test Results (1GHz-25GHz)

Test Mode: 2402.5MHZ					Test channel: Lowest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4805.00	39.64	34.04	6.58	34.09	46.17	74.00	-27.83	V
7207.50	33.38	37.11	7.73	34.50	43.72	74.00	-30.28	V
9610.00	32.84	39.31	9.23	34.79	46.59	74.00	-27.41	V
12012.50	*					74.00		V
14415.00	*					74.00		V
4805.00	44.40	34.04	6.58	34.09	50.93	74.00	-23.07	H
7207.50	35.34	37.11	7.73	34.50	45.68	74.00	-28.32	H
9610.00	32.49	39.31	9.23	34.79	46.24	74.00	-27.76	H
12012.50	*					74.00		H
14415.00	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4805.00	28.01	34.04	6.58	34.09	34.54	54.00	-19.46	V
7207.50	21.80	37.11	7.73	34.50	32.14	54.00	-21.86	V
9610.00	20.73	39.31	9.23	34.79	34.48	54.00	-19.52	V
12012.50	*					54.00		V
14415.00	*					54.00		V
4805.00	32.49	34.04	6.58	34.09	39.02	54.00	-14.98	H
7207.50	24.12	37.11	7.73	34.50	34.46	54.00	-19.54	H
9610.00	20.65	39.31	9.23	34.79	34.40	54.00	-19.60	H
12012.50	*					54.00		H
14415.00	*					54.00		H

Test Results (1GHz-25GHz)

Test Mode: 2440.5MHZ					Test channel: Middle			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4881.00	37.76	34.38	6.69	34.09	44.74	74.00	-29.26	V
7321.50	32.13	37.22	7.78	34.53	42.60	74.00	-31.40	V
9762.00	31.73	39.46	9.35	34.80	45.74	74.00	-28.26	V
12202.50	*					74.00		V
14643.00	*					74.00		V
4881.00	42.13	34.38	6.69	34.09	49.11	74.00	-24.89	H
7321.50	33.92	37.22	7.78	34.53	44.39	74.00	-29.61	H
9762.00	31.20	39.46	9.35	34.80	45.21	74.00	-28.79	H
12202.50	*					74.00		H
14643.00	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4881.00	26.50	34.38	6.69	34.09	33.48	54.00	-20.52	V
7321.50	20.77	37.22	7.78	34.53	31.24	54.00	-22.76	V
9762.00	19.82	39.46	9.35	34.80	33.83	54.00	-20.17	V
12202.50	*					54.00		V
14643.00	*					54.00		V
4881.00	30.78	34.38	6.69	34.09	37.76	54.00	-16.24	H
7321.50	22.98	37.22	7.78	34.53	33.45	54.00	-20.55	H
9762.00	19.59	39.46	9.35	34.80	33.60	54.00	-20.40	H
12202.50	*					54.00		H
14643.00	*					54.00		H

Test Results (1GHz-25GHz)

Test Mode: 2480.0MHZ					Test channel: Highest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4960.00	36.77	34.72	6.79	34.09	44.19	74.00	-29.81	V
7440.00	31.48	37.34	7.82	34.57	42.07	74.00	-31.93	V
9920.00	31.15	39.62	9.46	34.81	45.42	74.00	-28.58	V
12400.00	*					74.00		V
14880.00	*					74.00		V
4960.00	40.95	34.72	6.79	34.09	48.37	74.00	-25.63	H
7440.00	33.18	37.34	7.82	34.57	43.77	74.00	-30.23	H
9920.00	30.52	39.62	9.46	34.81	44.79	74.00	-29.21	H
12400.00	*					74.00		H
14880.00	*					74.00		H
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
4960.00	25.76	34.72	6.79	34.09	33.18	54.00	-20.82	V
7440.00	20.27	37.34	7.82	34.57	30.86	54.00	-23.14	V
9920.00	19.38	39.62	9.46	34.81	33.65	54.00	-20.35	V
12400.00	*					54.00		V
14880.00	*					54.00		V
4960.00	29.93	34.72	6.79	34.09	37.35	54.00	-16.65	H
7440.00	22.41	37.34	7.82	34.57	33.00	54.00	-21.00	H
9920.00	19.07	39.62	9.46	34.81	33.34	54.00	-20.66	H
12400.00	*					54.00		H
14880.00	*					54.00		H

Remark:

1. Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

Radiated Band Edge:

Test Mode: CH 01					Test channel: Lowest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2390.00	43.65	29.15	3.41	34.01	42.20	74.00	-31.80	H
2400.00	60.54	29.16	3.43	34.01	59.12	74.00	-14.88	H
2390.00	44.27	29.15	3.41	34.01	42.82	74.00	-31.18	V
2400.00	62.66	29.16	3.43	34.01	61.24	74.00	-12.76	V
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2390.00	34.02	29.15	3.41	34.01	32.57	54.00	-21.43	H
2400.00	45.31	29.16	3.43	34.01	43.89	54.00	-10.12	H
2390.00	34.02	29.15	3.41	34.01	32.57	54.00	-21.43	V
2400.00	47.03	29.16	3.43	34.01	45.61	54.00	-8.39	V

Test Mode: CH 16					Test channel: Highest			
Peak Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2483.50	45.84	29.28	3.53	34.03	44.62	74.00	-29.38	H
2500.00	44.87	29.30	3.56	34.03	43.70	74.00	-30.30	H
2483.50	46.81	29.28	3.53	34.03	45.59	74.00	-28.41	V
2500.00	45.94	29.30	3.56	34.03	44.77	74.00	-29.23	V
Average Value								
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Pol.
2483.50	36.86	29.28	3.53	34.03	35.64	54.00	-18.36	H
2500.00	34.75	29.30	3.56	34.03	33.58	54.00	-20.42	H
2483.50	38.13	29.28	3.53	34.03	36.91	54.00	-17.09	V
2500.00	34.74	29.30	3.56	34.03	33.57	54.00	-20.43	V

Remark:

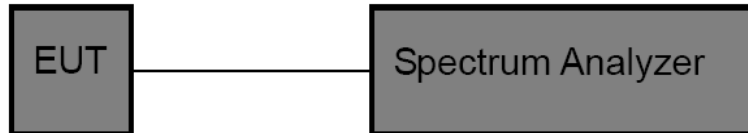
1. Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

5. Maximum Peak Output Power Test

5.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (b)(3)
Test Limit	1W or 125 mW

5.2. Test Setup



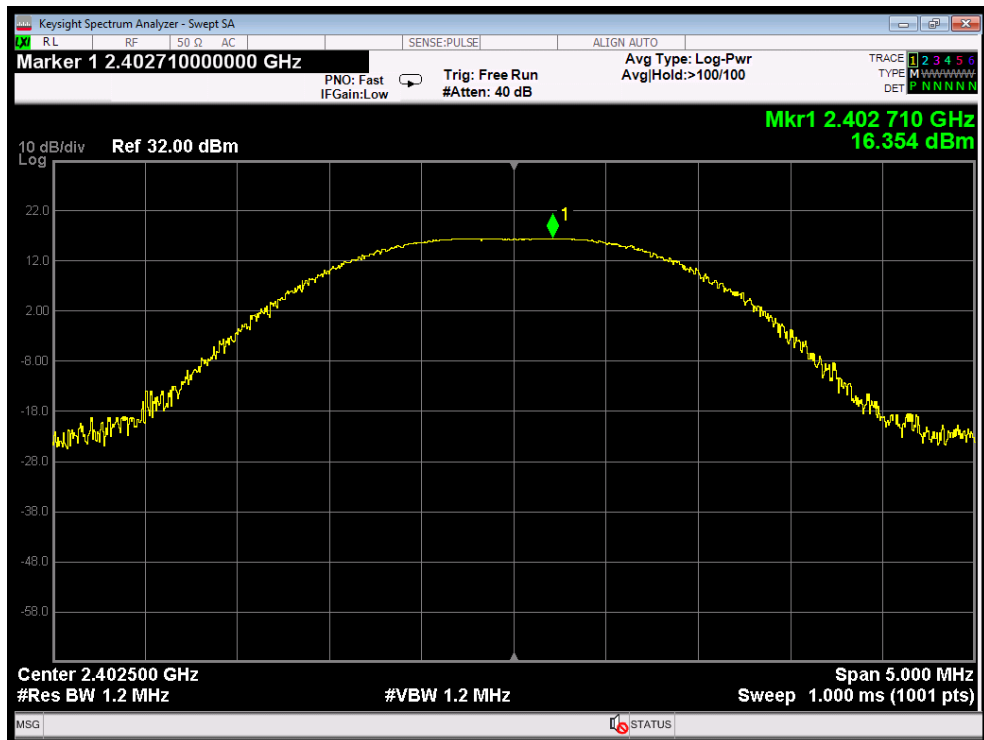
5.3. Test Procedure

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above,
- Spectrum Setting:
 - RBW > the 20 dB bandwidth of the emission being measured
 - Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
 - VBW ≥ RBW
 - Sweep = auto
 - Detector function = peak
 - Trace = max hold

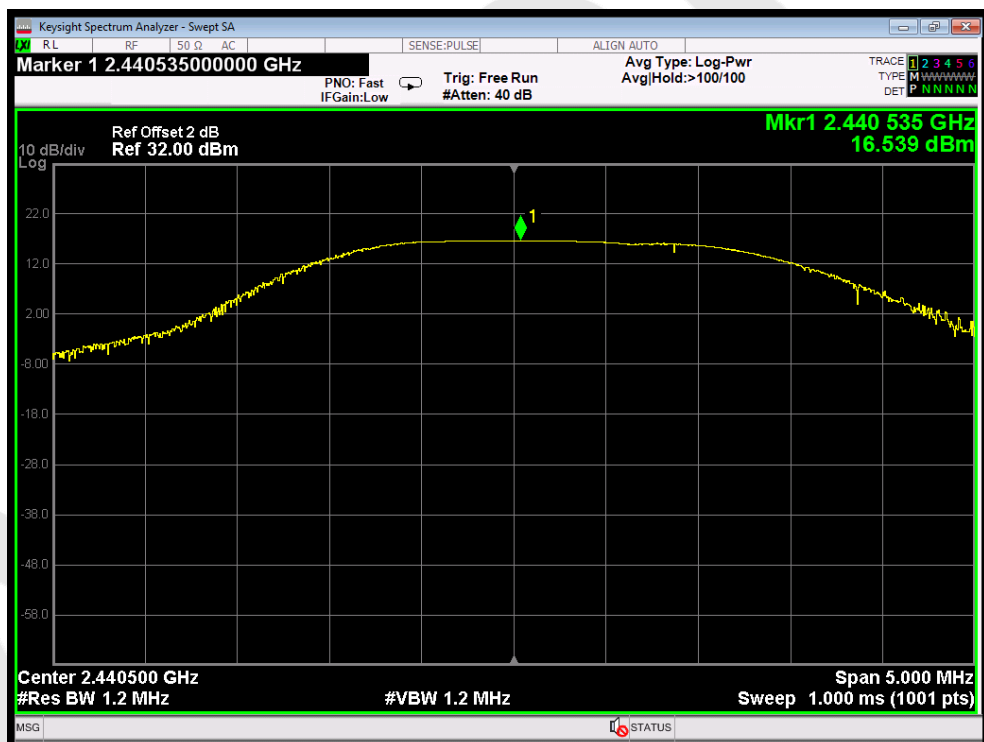
5.4. Test Data

Test Item	:	Max. peak output power	Test Mode	:	CH Low ~ CH High
Test Voltage	:	DC 6V Battery inside	Temperature	:	24°C
Test Result	:	PASS	Humidity	:	55%RH

Channel Frequency (MHz)	Peak Power output (dBm)	Limit (dBm)	Results
2402.5	16.354	30	PASS
2440.5	16.539	30	PASS
2480.0	16.253	30	PASS



Test Mode:---Low



Test Mode: ---Middle



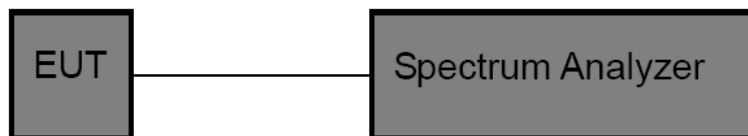
Test Mode: ---High

6. 20DB Occupy Bandwidth Test

6.1. Test Standard

Test Standard	FCC Part15 C Section 15.247 (a)(1)
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6.2. Test Setup



6.3. Test Procedure

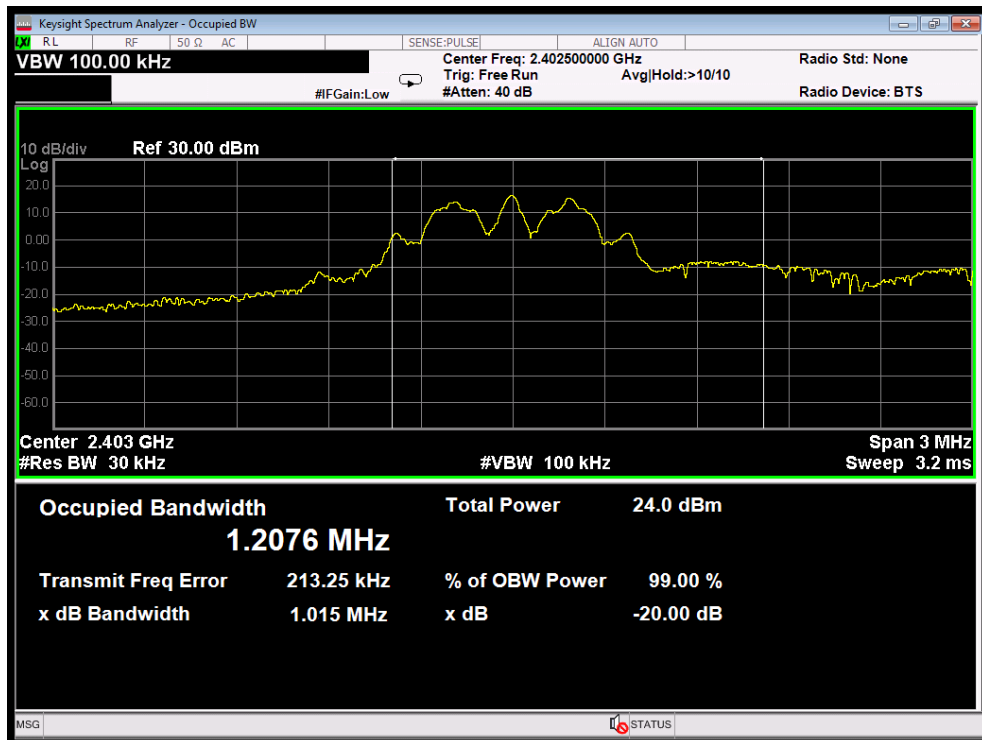
Using the following spectrum analyzer settings:

1. Span= approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel.
2. Set the RBW = 30 kHz.
3. Set the VBW = 100 kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

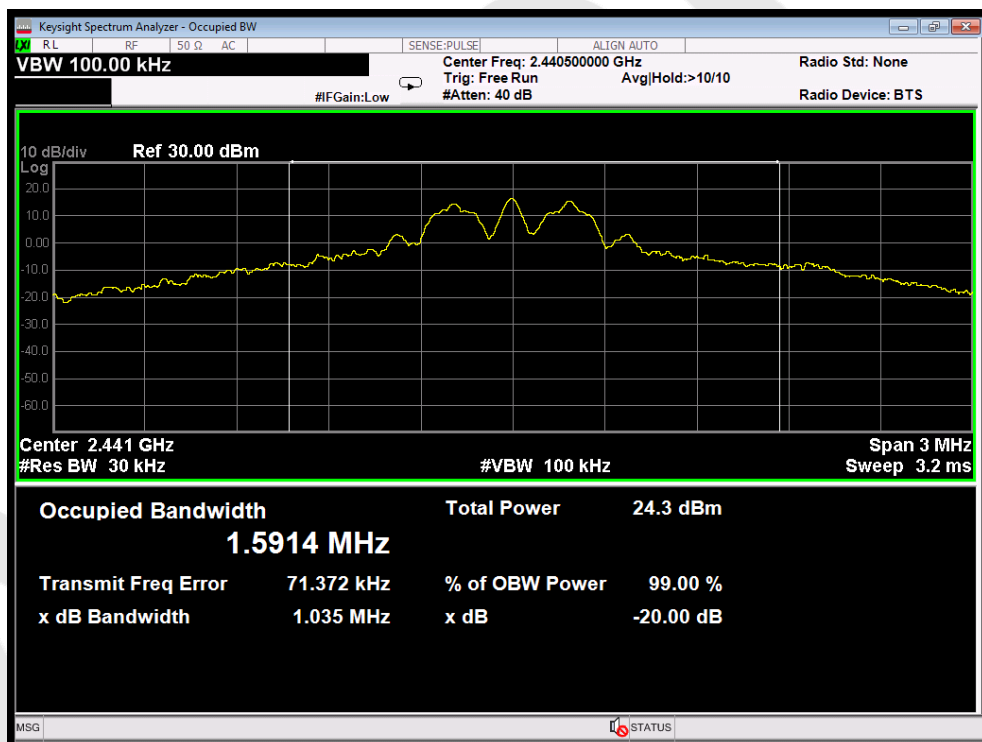
6.4. Test Data

Test Item	: 20dB BW	Test Mode	: CH Low ~ CH High
Test Voltage	: DC 6V Battery inside	Temperature	: 24℃
Test Result	: PASS	Humidity	: 55%RH

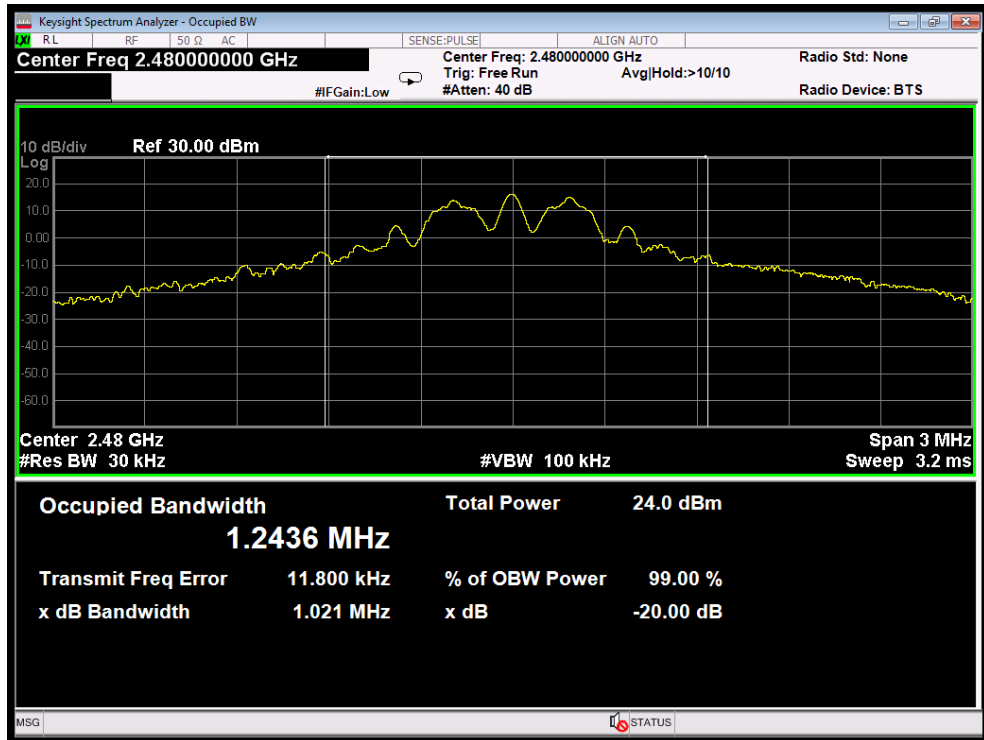
Channel	Frequency(MHz)	20dB Down BW(kHz)
Low	2402.5	1015
Middle	2440.5	1035
High	2480.0	1021



Test Mode: ---Low



Test Mode: ---Middle



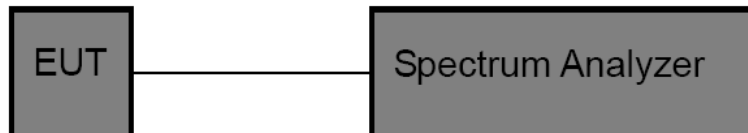
Test Mode: ---High

7. Carrier Frequency Separation Test

7.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	>25KHz or >two-thirds of the 20 dB bandwidth

7.2. Test Setup



7.3. Test Procedure

The EUT must have its hopping function enabled. Using the following spectrum analyzer settings:

1. Span= Wide enough to capture the peaks of two adjacent channels
2. Set the RBW = 30 kHz.
3. Set the VBW = 100 kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

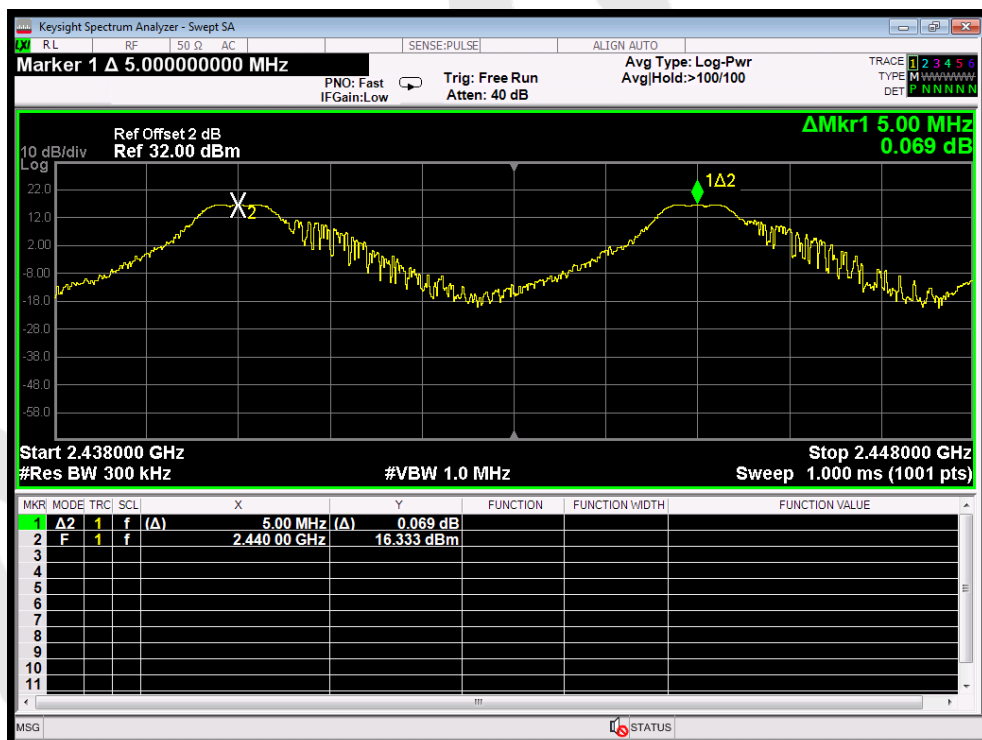
7.4. Test Data

Test Item	: Frequency Separation	Test Mode	: CH Low ~ CH High
Test Voltage	: DC 6V Battery inside	Temperature	: 24℃
Test Result	: PASS	Humidity	: 55%RH

Channel	Frequency (MHz)	Separation Read Value (kHz)	Limit (kHz)
Low	2402.5	5000	1015
Middle	2440.5	5000	1035
High	2480.0	5000	1021



Test Mode: ---Low



Test Mode: ---Middle



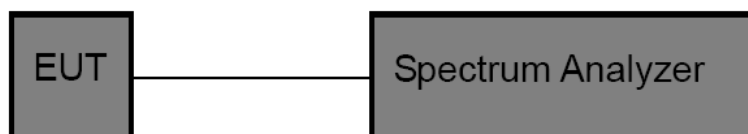
Test Mode: ---High

8. Number of Hopping Channel Test

8.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	>15 channels

8.2. Test Setup



8.3. Test Procedure

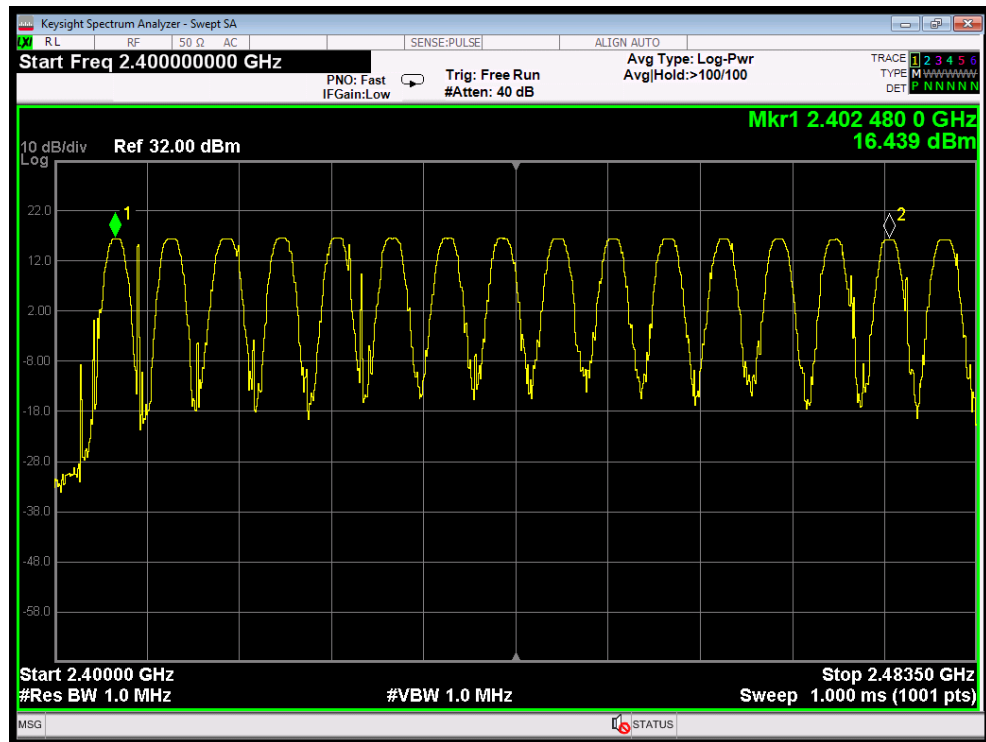
The EUT must have its hopping function enabled. Using the following spectrum analyzer setting:

1. Span= the frequency band of operation
2. Set the RBW = 100kHz.
3. Set the VBW = 300kHz.
4. Sweep time = auto couple.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

8.4. Test Data

Test Item	: Number of Hopping Frequency	Test Mode	: CH Low ~ CH High
Test Voltage	: DC 6V Battery inside	Temperature	: 24°C
Test Result	: PASS	Humidity	: 55%RH

Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel
2402.5-2480MHz	16	≥ 15

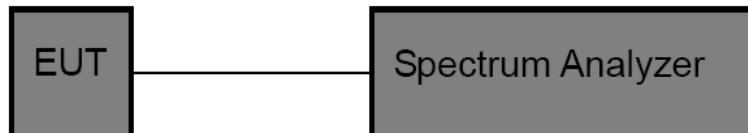


9. Dwell Time Test

9.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (a)(1)
Test Limit	0.4 sec

9.2. Test Setup



9.3. Test Procedure

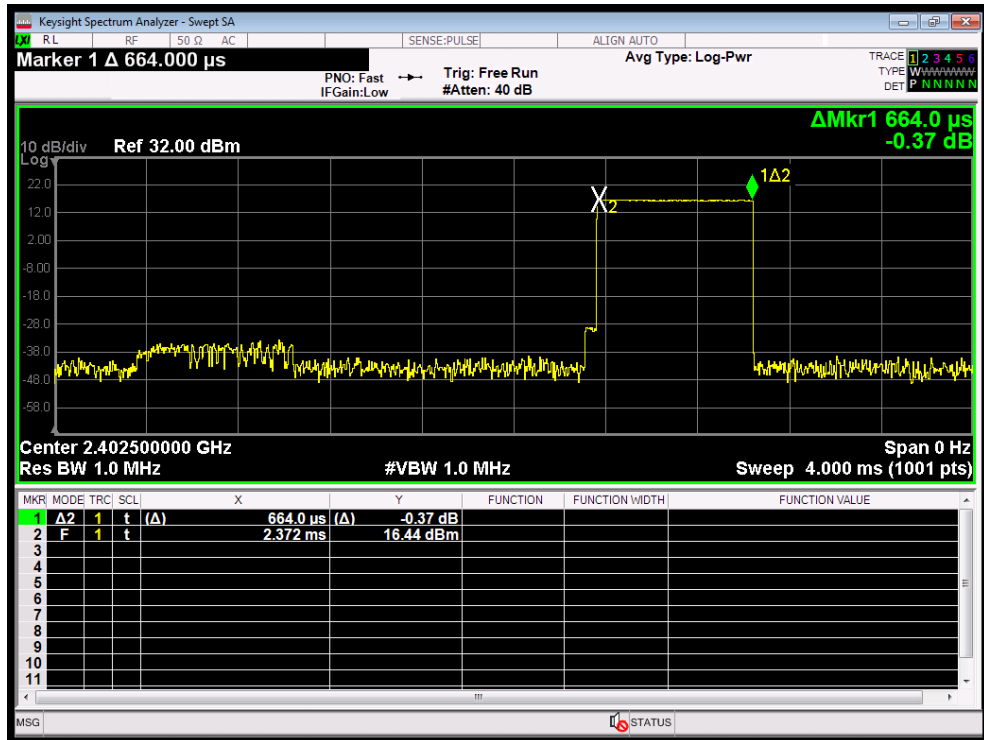
The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span= zero span, centered on a hopping channel
2. Set the RBW = 1 MHz.
3. Set the VBW = 1 MHz.
4. Sweep time = as necessary to capture the entire dwell time per hopping channel.
5. Detector function = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

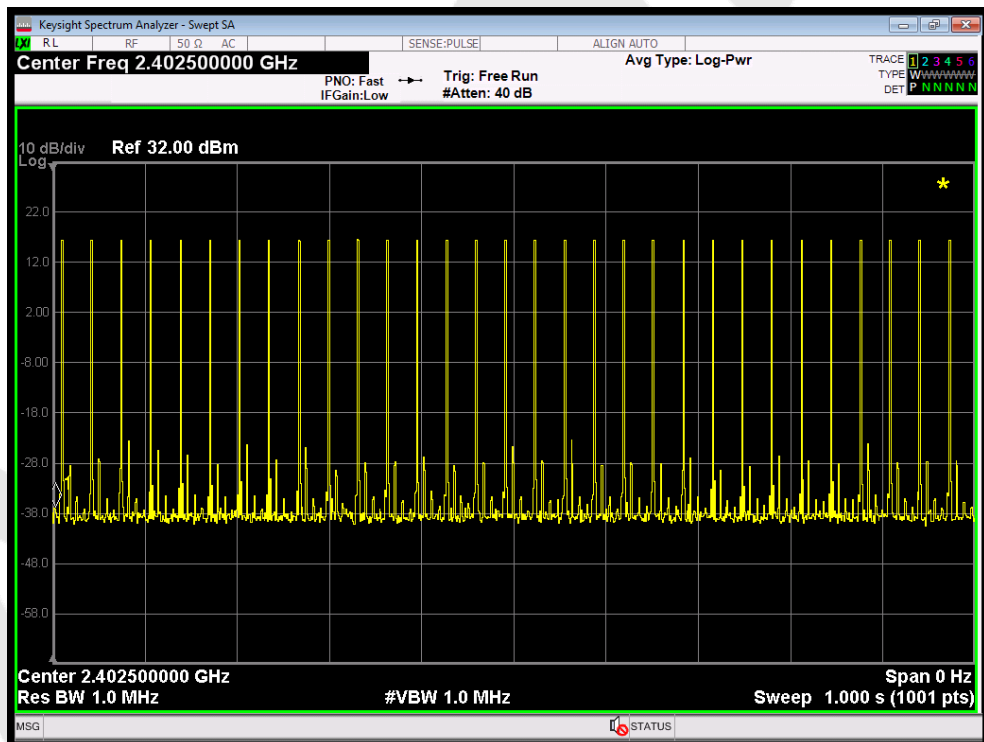
9.4. Test Data

Test Item	: Time of Occupancy	Test Mode	: CH Low ~ CH High
Test Voltage	: DC 6V Battery inside	Temperature	: 24°C
Test Result	: PASS	Humidity	: 55%RH

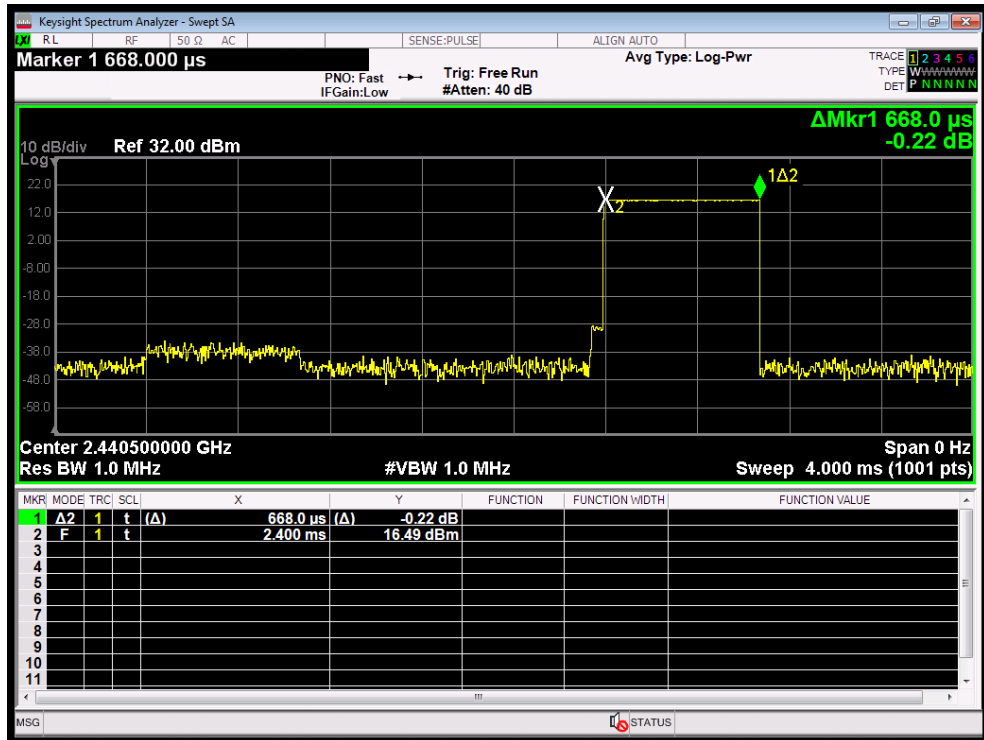
Type	Pulse width (ms)	Time slot length(ms)	Dwell time (ms)	Limit (s)
CH Low	0.664	Ton * Ton times in 1s * 0.4s * channel numbers=0.664ms*31*0.4*16	131.74	0.4
CH Middle	0.668	Ton * Ton times in 1s * 0.4s * channel numbers=0.668ms*31*0.4*16	132.53	0.4
CH High	0.664	Ton * Ton times in 1s * 0.4s * channel numbers=0.664ms*31*0.4*16	131.74	0.4



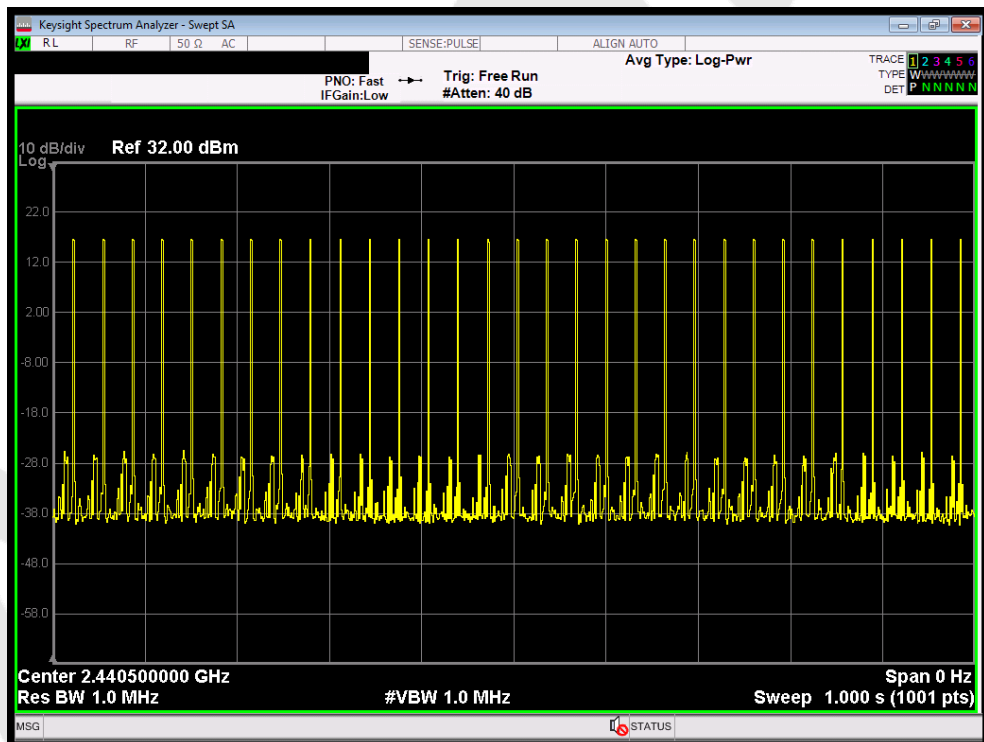
Ton(CH Low)



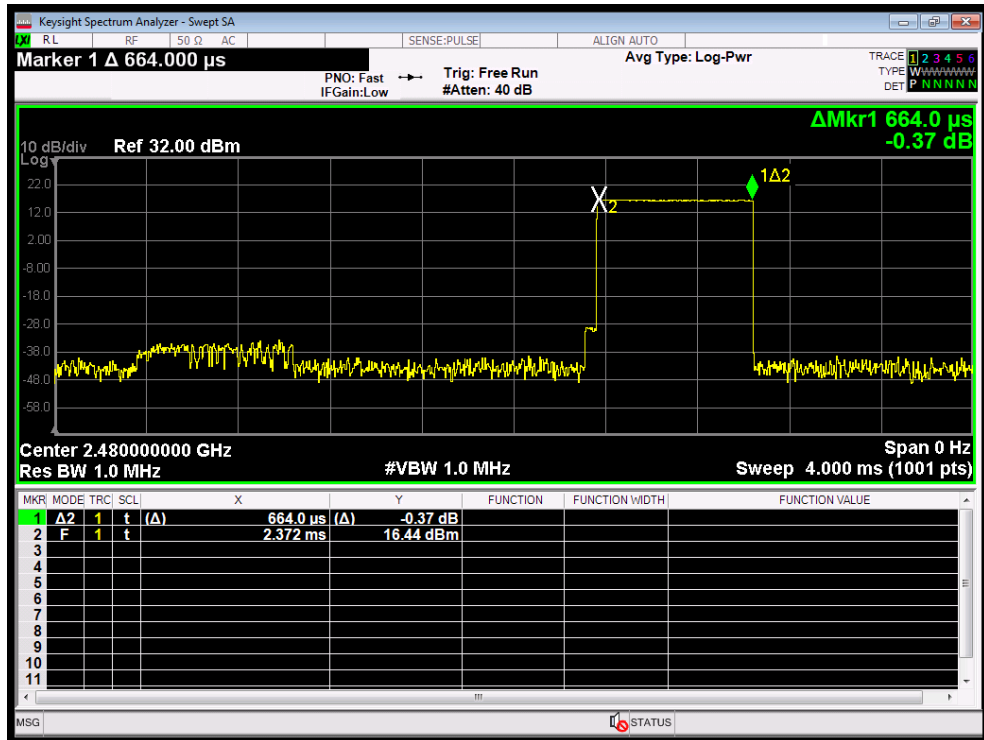
Ton times in 1s(CH Low)



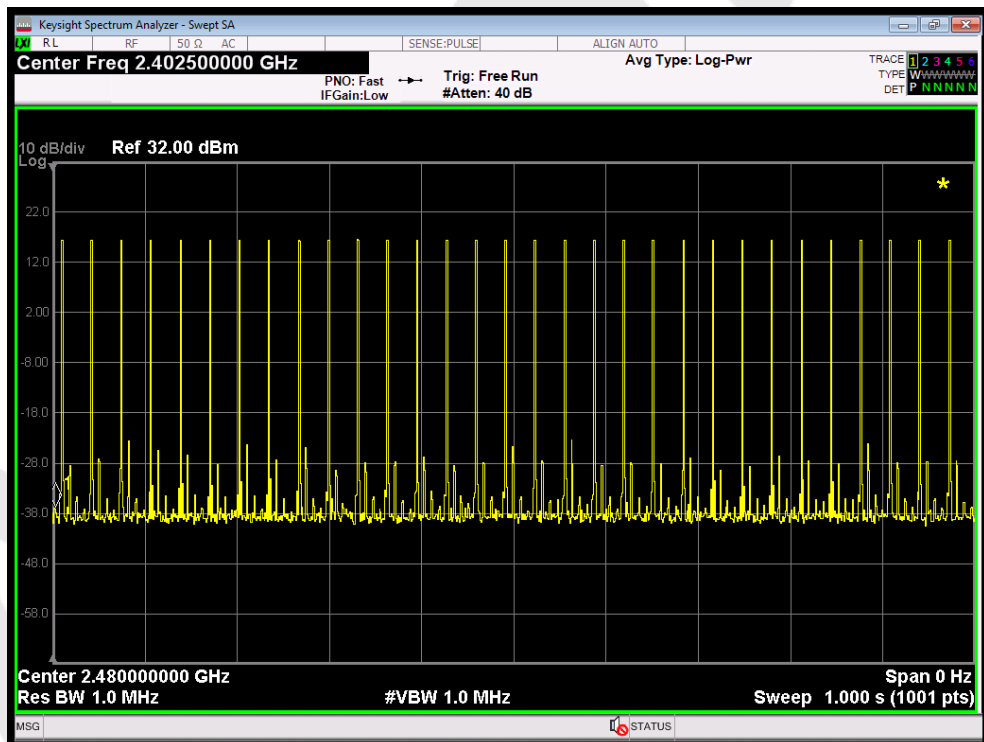
Ton(CH Middle)



Ton times in 1s(CH Middle)



Ton(CH High)



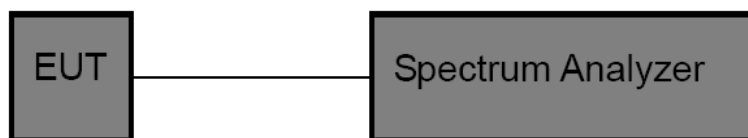
Ton times in 1s(CH High)

10. 100kHz Bandwidth of Frequency Band Edge Requirement

10.1. Test Standard and Limit

Test Standard	FCC Part15 C Section 15.247 (d)
Test Limit	in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

10.2. Test Setup



10.3. Test Procedure

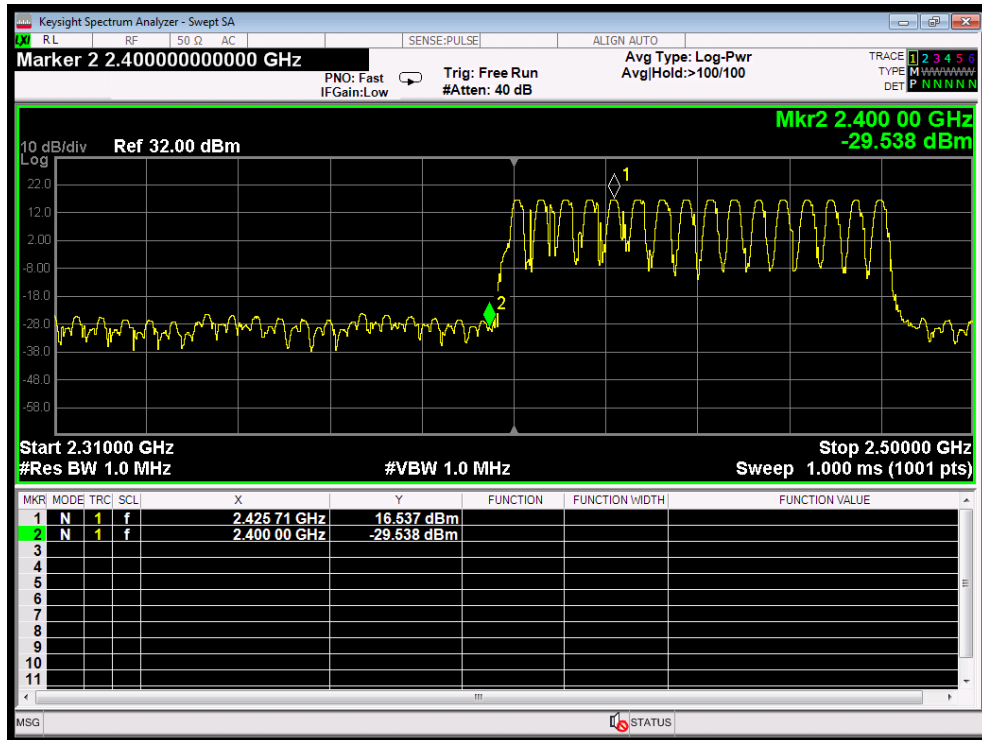
The EUT must have its hopping/Non-hopping function enabled. Using the following spectrum analyzer setting:

1. Set the RBW = 100kHz.
2. Set the VBW = 300kHz.
3. Sweep time = auto couple.
4. Detector function = peak.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.

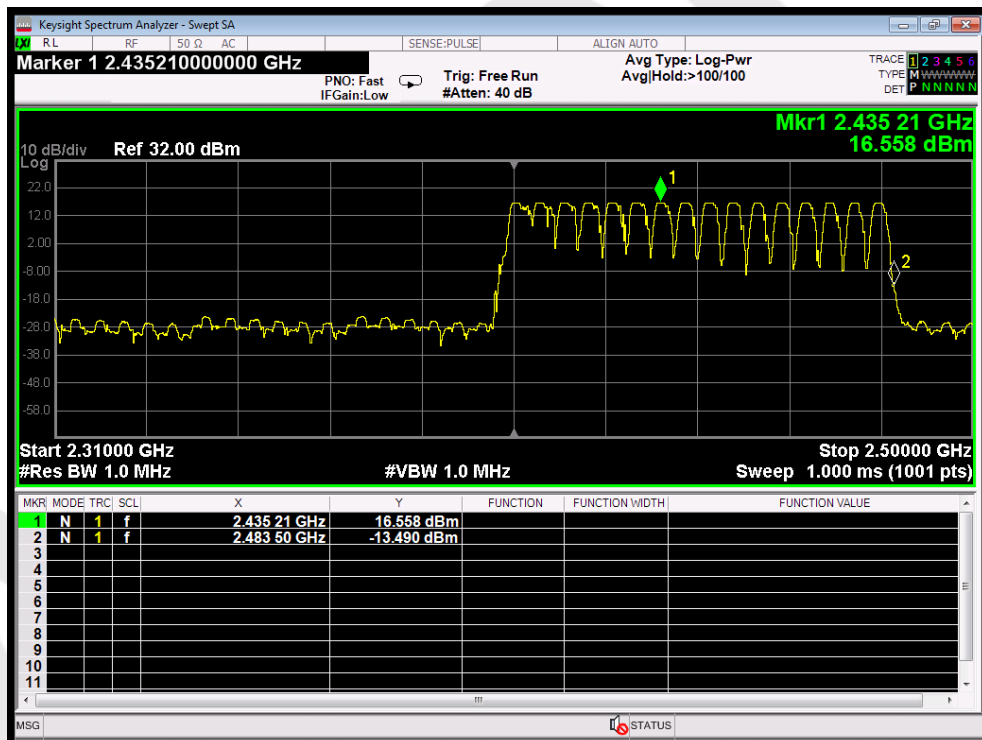
10.4. Test Data

Test Item	: Band edge	Test Mode	: CH Low ~ CH High
Test Voltage	: DC 6V Battery inside	Temperature	: 24°C
Test Result	: PASS	Humidity	: 55%RH

For Hopping Mode



mode -- Lowest

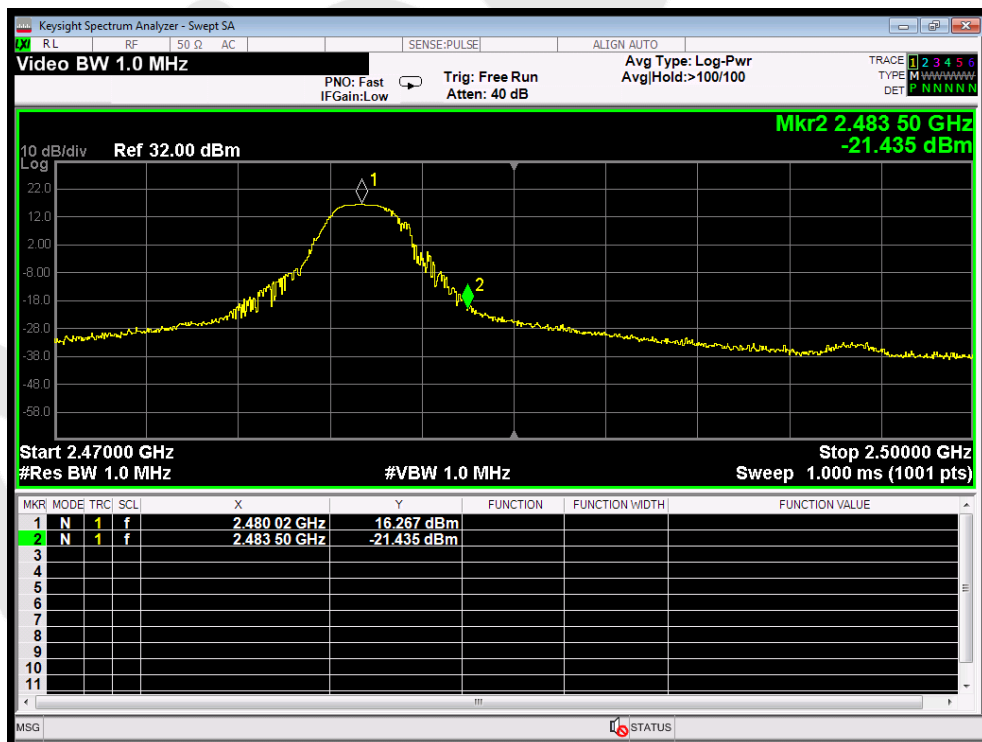


mode -- Highest

For Non-Hopping Mode

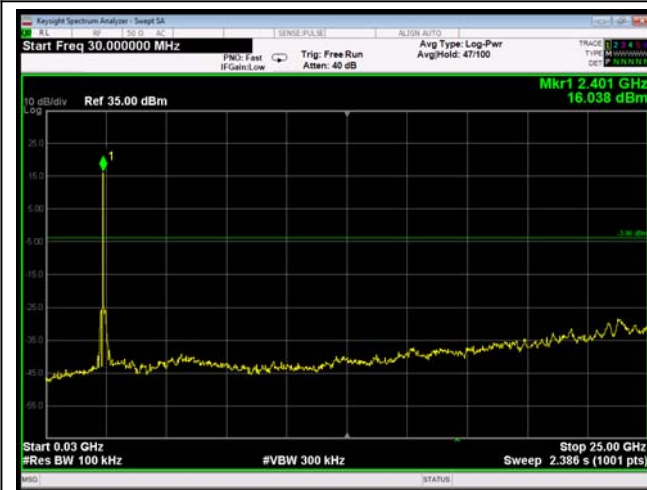


mode -- Lowest

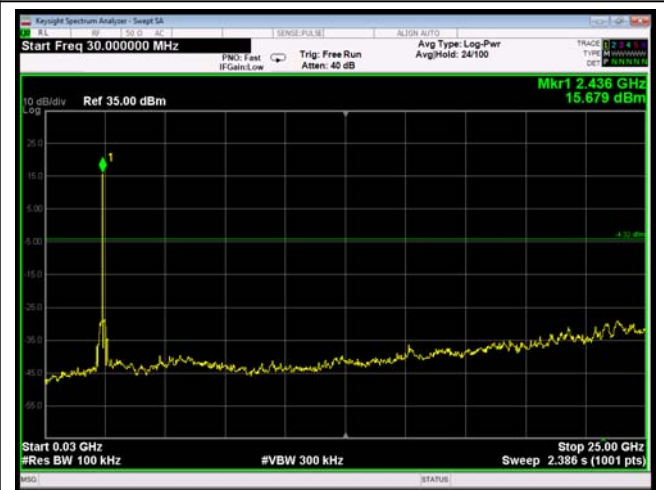


mode -- Highest

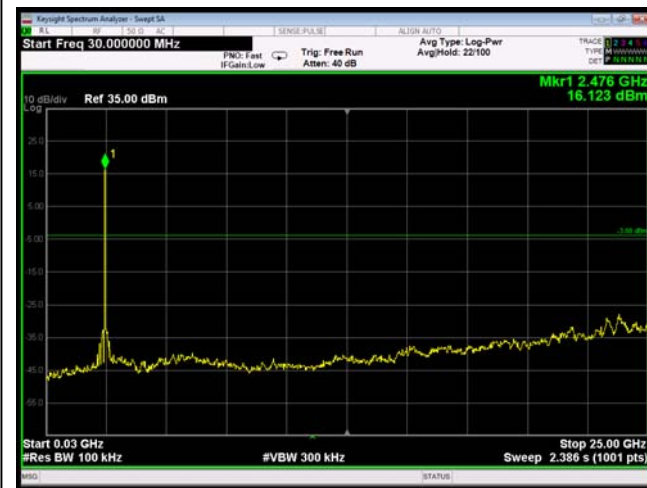
Conducted Emission Method



Test Mode: ---Low



Test Mode: ---Mid



Test Mode:---High

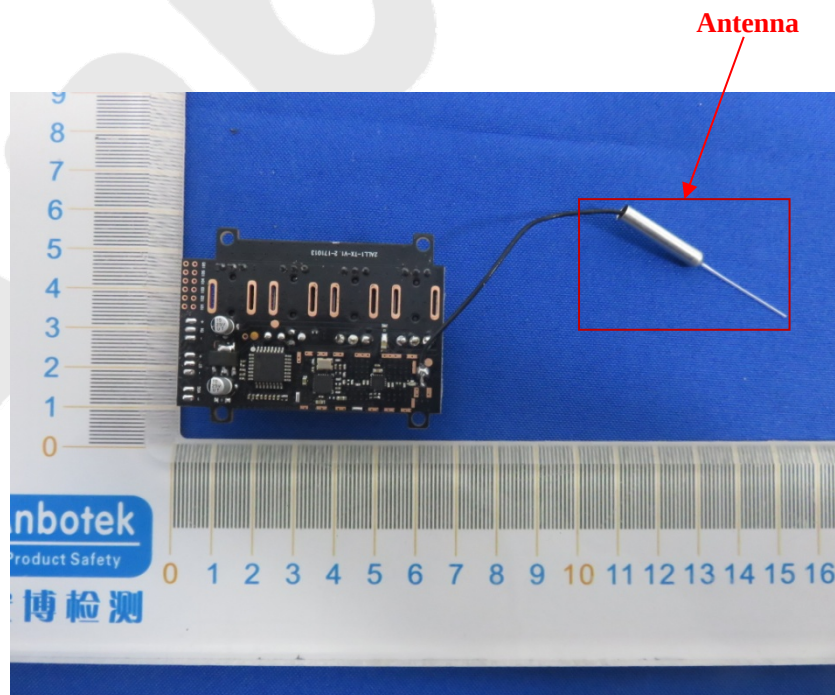
11. Antenna Requirement

11.1. Test Standard and Requirement

Test Standard	FCC Part15 Section 15.203 /247(c)
Requirement	1) 15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 2) 15.247(c) (1)(i) requirement: Systems operating in the 2402.5-2480 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

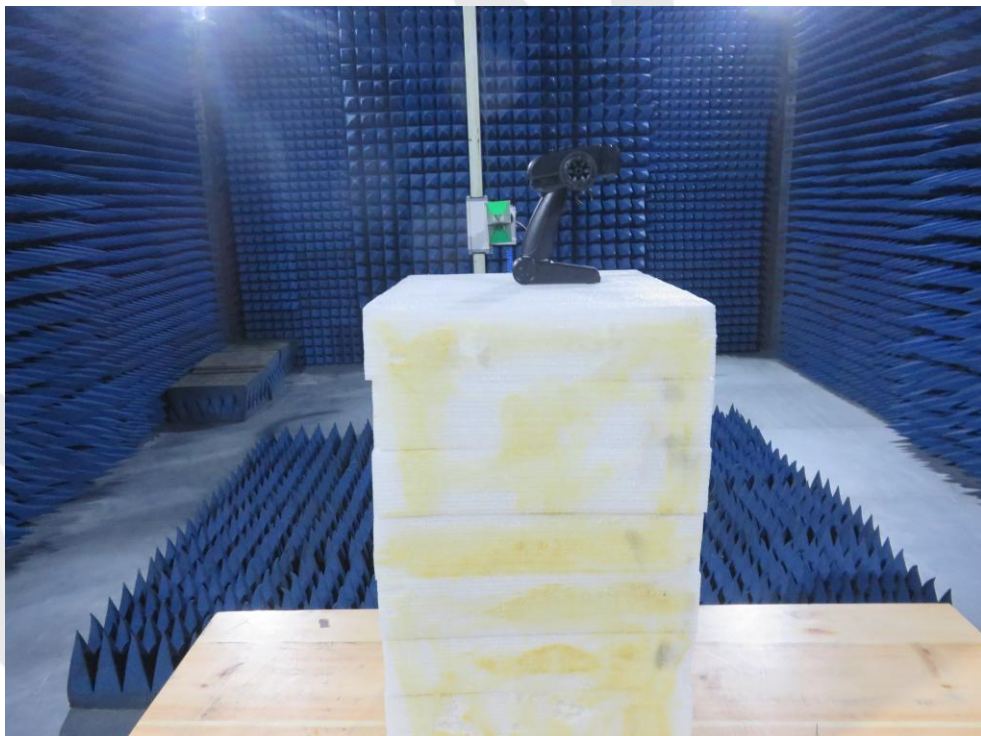
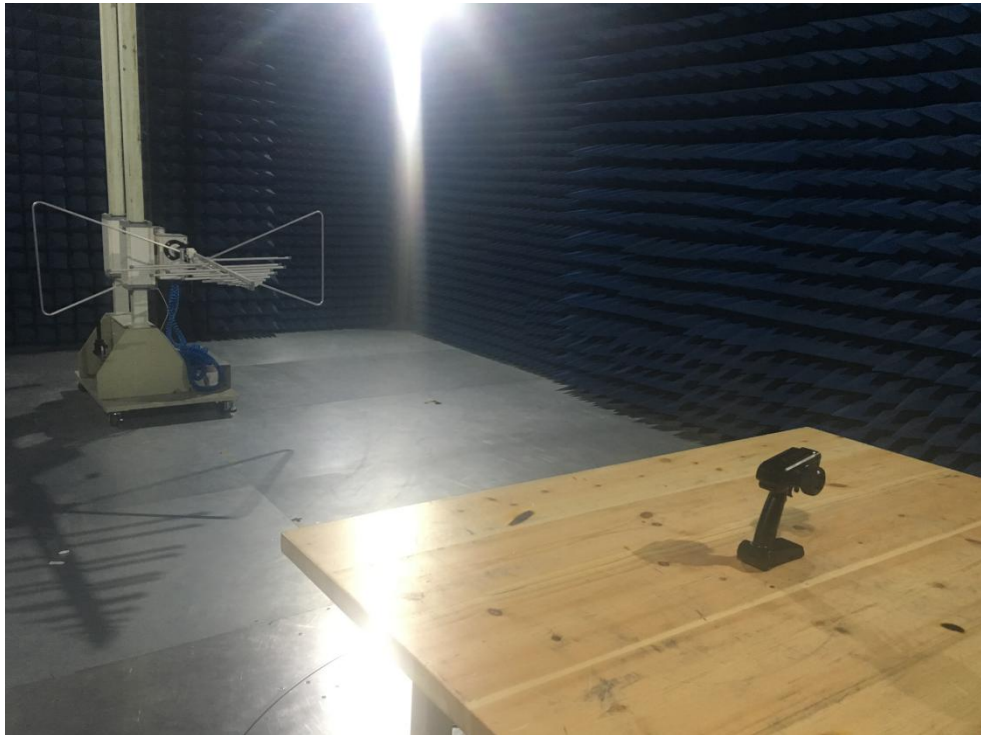
11.2. Antenna Connected Construction

The bluetooth antenna is Copper coil Antenna which permanently attached, and the best case gain of the antenna is 2.0 dBi. It complies with the standard requirement.



APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Radiation Emission Test



APPENDIX II -- EXTERNAL PHOTOGRAPH

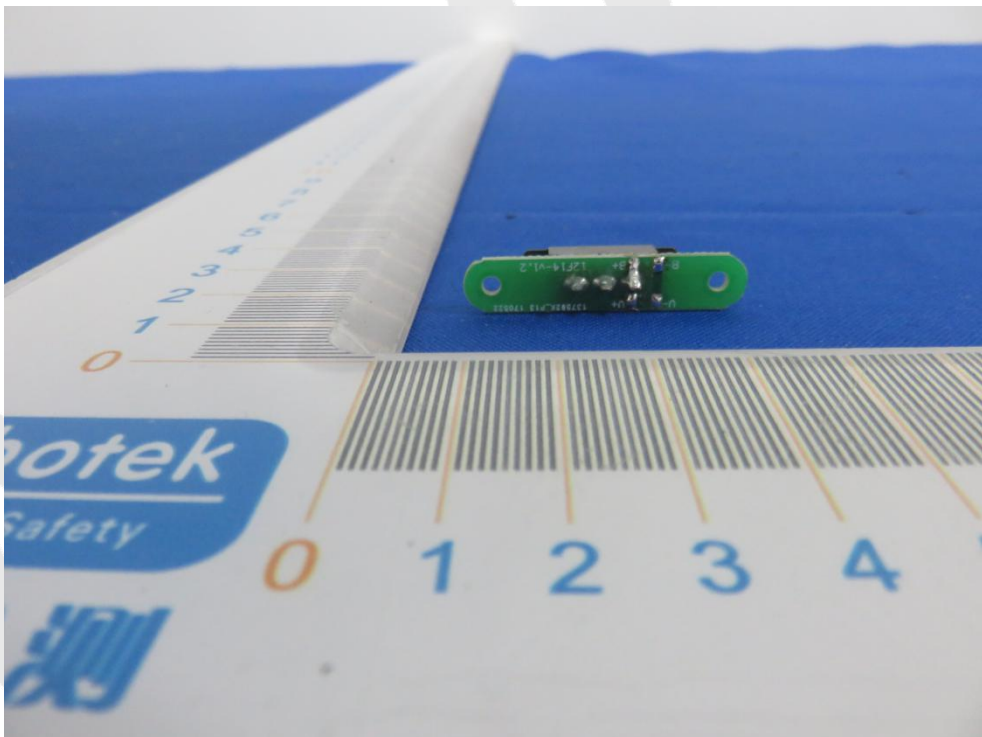
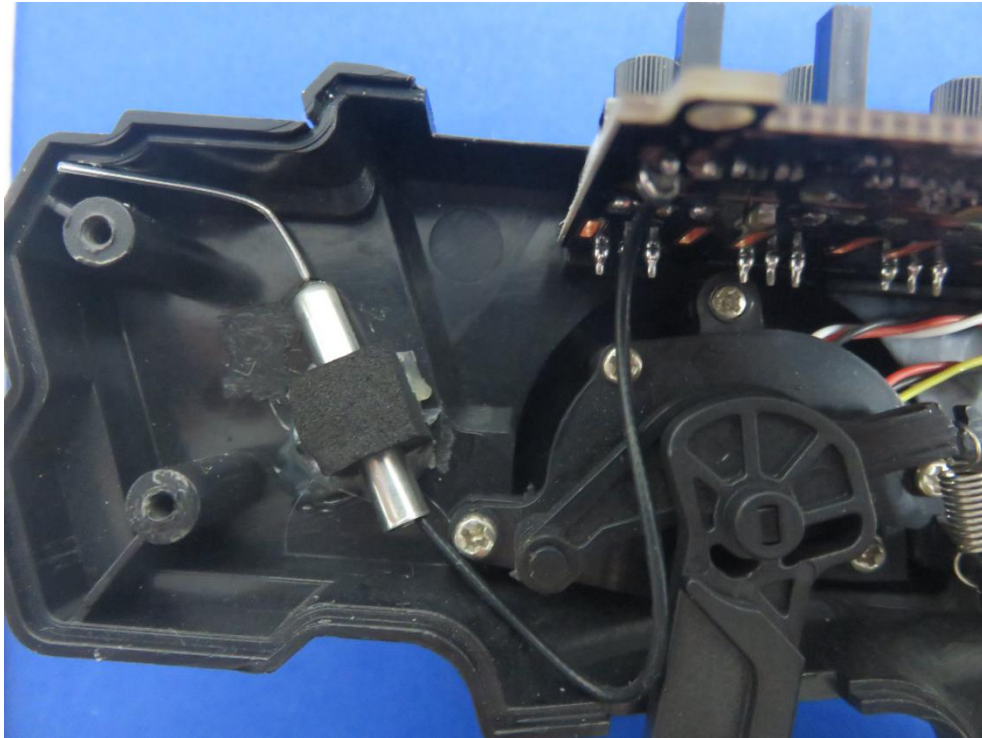


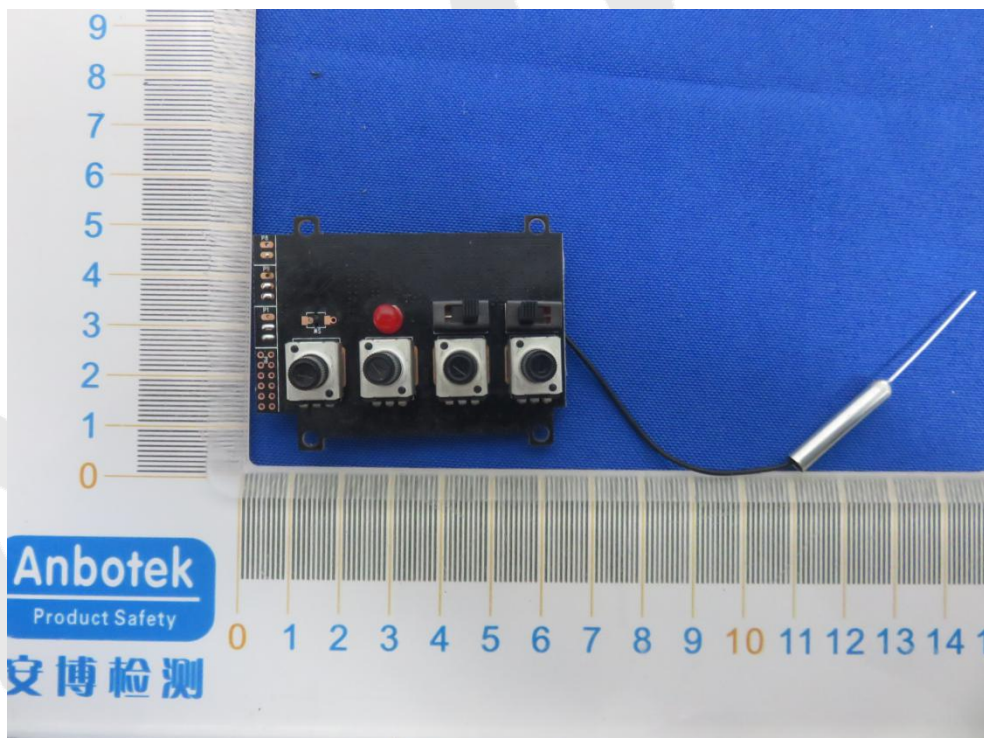
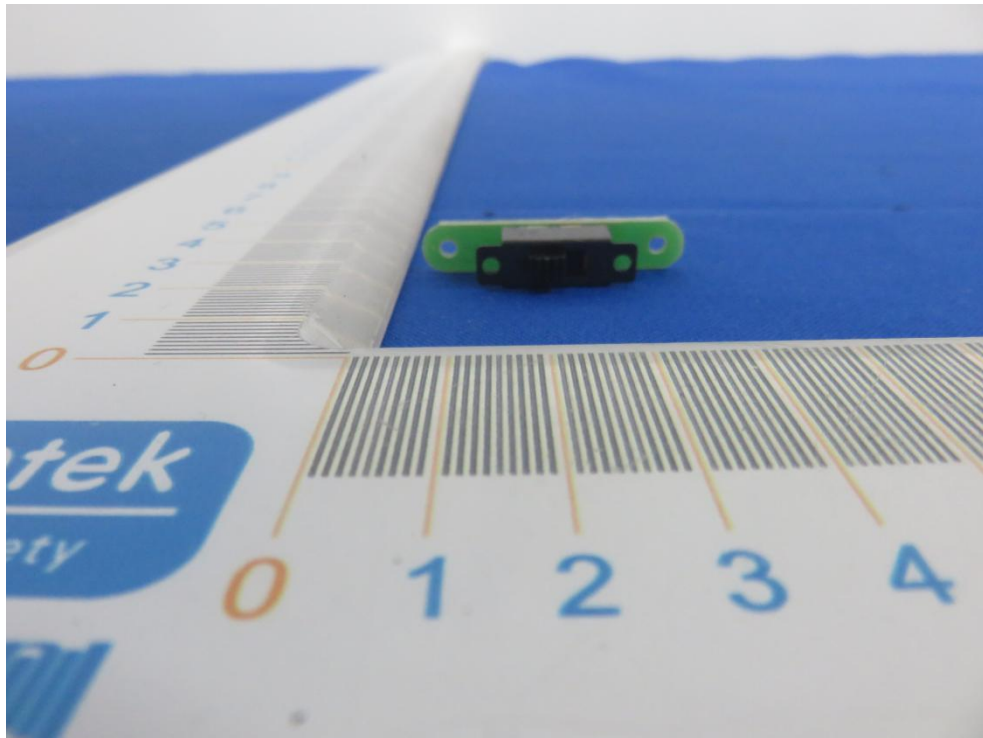


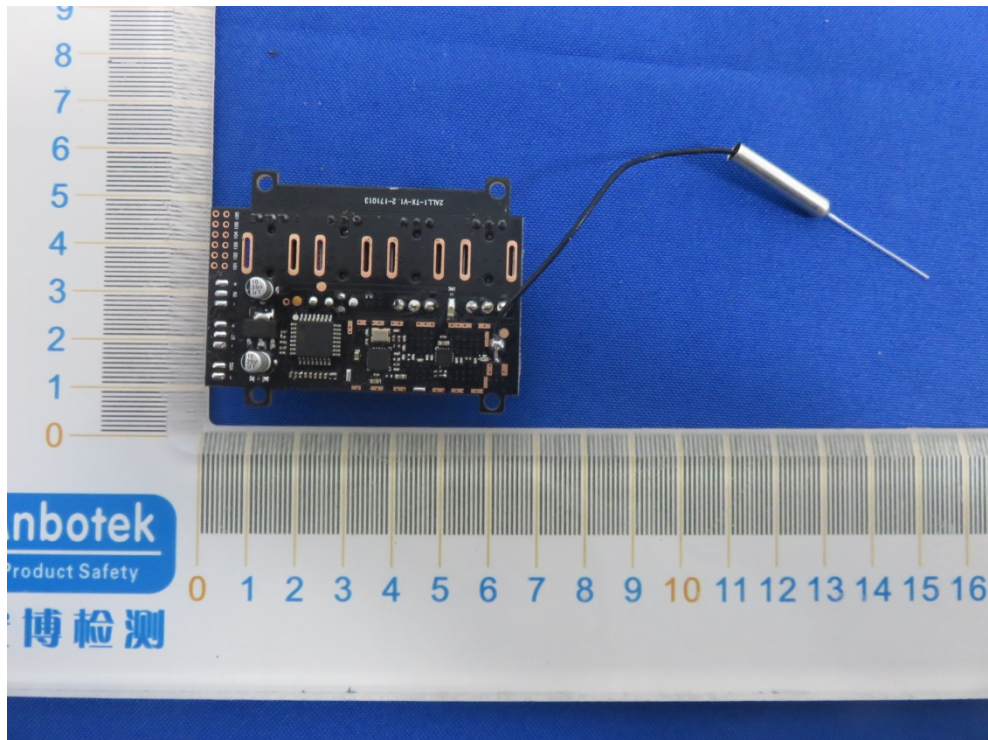


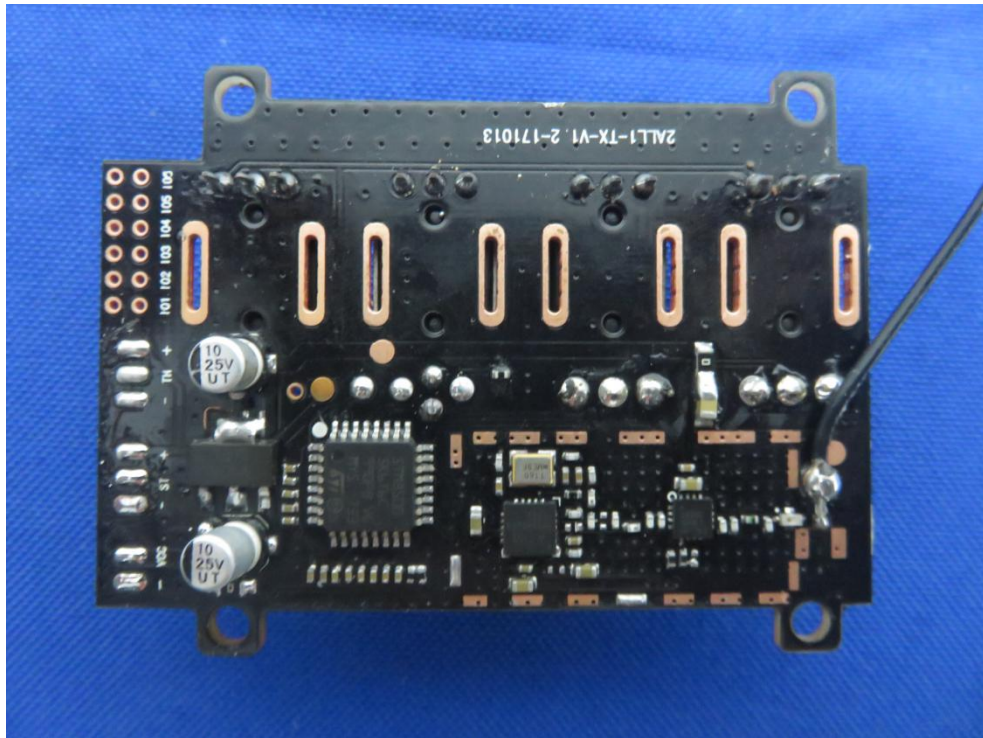
APPENDIX III -- INTERNAL PHOTOGRAPH











----- End of Report-----